![FLIR]

Installation Manual
F-Series

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Important Instructions and Notices to the User:

Modification of this device without the express authorization of FLIR Commercial Systems, Inc. may void the user's authority under FCC rules to operate this device.

Modification of this device without the express authorization of FLIR Commercial Systems, Inc., may void the user's authority under the FCC Rules to operate this device.

Note 1: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Shielded cables must be used to connect this device to other devices.

Note 2: If ferrites are supplied with this equipment, the equipment was tested for compliance with the FCC limits for a Class A digital device using power cables with the ferrites installed. When connecting one or two power cables to the equipment, the supplied ferrites must be used with this equipment.

Industry Canada Notice:
This Class B digital apparatus complies with Canadian ICES-003.

Avis d'Industrie Canada:
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Proper Disposal of Electrical and Electronic Equipment (EEE)

The European Union (EU) has enacted Waste Electrical and Electronic Equipment Directive 2002/96/EC (WEEE), which aims to prevent EEE waste from arising; to encourage reuse, recycling, and recovery of EEE waste; and to promote environmental responsibility.

In accordance with these regulations, all EEE products labeled with the "crossed out wheeled bin" either on the product itself or in the product literature must not be disposed of in regular rubbish bins, mixed with regular household or other commercial waste, or by other regular municipal waste collection means. Instead, and in order to prevent possible harm to the environment or human health, all EEE products (including any cables that came with the product) should be responsibly discarded or recycled.

To identify a responsible disposal method where you live, please contact your local waste collection or recycling service, your original place of purchase or product supplier, or the responsible government authority in your area. Business users should contact their supplier or refer to their purchase contract.

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1   F-Series Camera Installation

This manual describes the installation of the F-Series cameras. If you need help during the installation process, contact your local FLIR service representative or, call 877-773-3547 inside the US. All installers and integrators are encouraged to take advantage of the training offered by FLIR; visit http://www.flir.com/training for more information.

This manual includes the following topics:

- Installation overview
- Mounting the camera and its components
- Connecting the electronics
- Bench testing the camera
- Basic configuration and operation of the camera
- Camera Specifications

For safety, and to achieve the highest levels of performance from the F-Series camera system, always follow the warnings and cautions in this manual when handling and operating the camera.

1.1   Warnings and Cautions

Warning!

If mounting the F-Series camera on a pole, tower or any elevated location, use industry standard safe practices to avoid injuries.

Caution!

Except as described in this manual, do not open the F-Series camera for any reason. Disassembly of the camera (including removal of the cover) can cause permanent damage and will void the warranty.

Be careful not to leave fingerprints on the F-Series camera's infrared optics.

The F-Series camera requires a power supply of 24 Volts. Operating the camera outside of the specified input voltage range or the specified operating temperature range can cause permanent damage.

1.2   References

F-SERIES Camera Mechanical Interface Control Document (ICD) (FLIR Doc # 427-0030-00-19)

- Available on the documentation CD or from the FLIR website, provides further details regarding mechanical dimensions and mounting for the F-Series camera.

Nexus IP Camera Configuration Guide (FLIR Doc # 427-0030-00-28)

- Available on the documentation CD or from the FLIR website, provides further details on using a web browser to configure the F-Series camera.

1.3   Camera Overview

The F-Series camera is both an analog and an IP camera. The video from the camera can be viewed over a traditional analog video network or it can be viewed by streaming it over an IP network using MPEG-4, M-JPEG and H.264 encoding. Analog video will require a connection to a video monitor or an

analog matrix/switch. The IP video will require a connection to an Ethernet network switch and a computer with the appropriate software for viewing the video stream.

1.4   Installation Overview

The F-Series Camera is an infrared thermal imaging camera intended for outdoor applications, and can be installed in a fixed location or on a pan/tilt mechanism.

**Shipping plugs only -
Remove before installing**

Figure 1-1: F-Series Camera

The F-Series camera is intended to be mounted on a medium-duty fixed pedestal mount or wall mount commonly used in the CCTV industry. Cables will exit from the back of the camera housing. The mount must support up to 30 lbs. (15 KG).

1.4.1   Camera Connection Options

Camera connections are made through water-tight cable gland seals on the rear of the camera. Refer to section 1.5.5 "Cable Gland Sealing" on page 1-4 to ensure the glands are used correctly and the connections are properly sealed.

The camera can be powered with a conventional power supply using 21 - 30 VAC or 21 - 30 VDC.

The F-Series Camera can produce analog or digital (IP) video output (or both). Analog video will require a connection to a video monitor or an analog video matrix switch.

An Ethernet connection is provided for IP video streaming and for command and control communications. A web browser can be used for camera configuration and maintenance (software/firmware updates). On some models, a web browser can also be used for IP video streaming and for command and control.

For analog installations that are not using Ethernet/IP, a serial cable (RS232 or RS422) can optionally be connected and used for command and control communications, supporting either Pelco D or Bosch protocols. In installations using analog video and serial communications, it is recommended an Ethernet cable should also be installed for camera configuration, operation, and troubleshooting.

For installations where the camera is mounted on a tower or pole or other location that may be difficult to access, it is recommended the Ethernet connection should be installed from the camera down to ground level at a minimum, to allow easier access.

1.4.2   Supplied Components

The F-Series camera includes these standard components:

*   Fixed Camera Unit
*   Cable Glands and Spare Parts kit

- FLIR Sensors Manager CD
- F-Series Camera Documentation Package

1.4.3   Required Components

The installer will need to supply the following items, which are specific to the installation.

- Electrical wire, for system power; up to 100' (3-conductor, shielded, gauge determined by cable length and supply voltage. Refer to section 1.6 "Camera Connections" on page 1-6.
- Camera grounding strap
- Coaxial RG59U video cables (BNC connector at the camera end) for analog video
- Shielded Category 6 Ethernet cable for control, streaming video, and for software upgrades.
- Optional serial cable for serial communications
- Miscellaneous electrical hardware, camera mount, connectors, and tools

1.5   Location Considerations

The camera will require connections for power, communications (IP Ethernet, and/or serial communications), and video.

Important Note

Install all cameras with an easily accessible Ethernet connection to support future software upgrades.

Ensure that cable distances do not exceed the specifications and that cables adhere to all local and Industry Standards, Codes, and Best Practices.

Important Note

If the camera is to be mounted on a pole or tower or other hard-to-reach location, connect and operate the camera as a bench test at ground level prior to mounting the camera in its final location.

1.5.1   Bench Testing

Connect the power, video, serial, and Ethernet connections and confirm that the video is displayed on a monitor when the power is turned on. For configuration and basic setup information using the onboard web server, refer to Basic Operation and Configuration on page 2-1.

1.5.2   Prior to Cutting/Drilling Holes

When selecting a mounting location for the F-Series camera, consider cable lengths and cable routing. Ensure the cables are long enough, given the proposed mounting locations and cable routing requirements, and route the cables before you install the components.

Use cables that have sufficient dimensions to ensure safety (for power cables) and adequate signal strength (for video and communications).

1.5.3   Camera Mounting

F-Series cameras must be mounted upright on top of the mounting surface, with the base below the camera. The unit should not be hung upside down.

The F-Series camera can be secured to the mount with three to five 1/4-20 threaded fasteners as shown below.
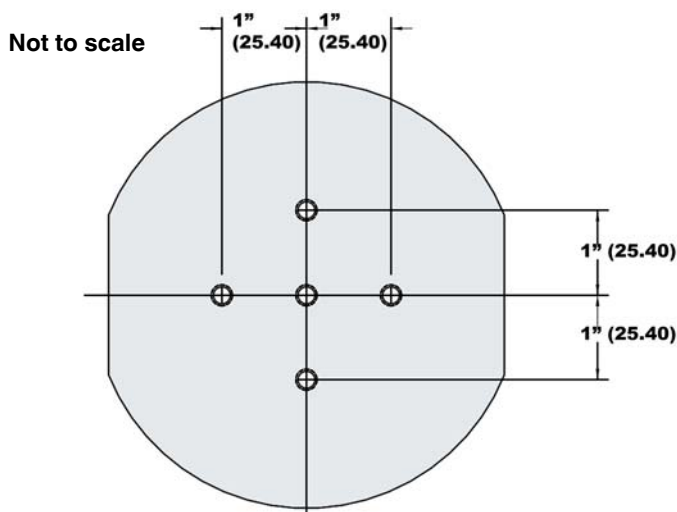
Figure 1-2: F-Series Camera Mounting Holes

Once the mounting location has been selected, verify both sides of the mounting surface are accessible.

Use a thread locking compound such as Loctite 242 or equivalent with all metal to metal threaded connections.

Once the holes are drilled in the mounting surface, install three (3) to five (5) 1/4-20 threaded fasteners into the base of the camera with thread-locking compound.

1.5.4   Removing the Back Cover

Use a 3 mm hex key to loosen the four captive screws, exposing the connections at the back of the camera enclosure. There is a grounding wire connected between the case and the back cover as shown. If the grounding wire is temporarily disconnected during the installation, it must be reconnected to ensure proper grounding of the camera.

1.5.5   Cable Gland Sealing

Proper installation of cable sealing glands and use of appropriate elastomer inserts is critical to long term reliability. Cables enter the camera mount enclosure through liquid-tight compression glands. Be sure to insert the cables through the cable glands on the enclosure before terminating and connecting them (the connectors will not fit through the cable gland). Leave the gland nuts loosened until all cable installation has been completed. Inspect and install gland fittings in the back cover with suitable leak sealant and tighten to ensure water tight fittings. Teflon tape or pipe sealant (i.e. DuPont RectorSeal T™) are suitable for this purpose.

1.5.6   Cable Glands and Spare Parts Kit

The kit contains the two 3/4" cable glands and gland seal plugs required for non-conduit installations.

The remaining parts included in the kit are:

- a spare ground wire
- a spare ground nut and lock washer
- two spare power terminal block plugs
- two spare serial port terminal block plugs
- four spare F-Series back cover screws
- four spare PT-Series back cover screws

1.5.7   Cable Gland Seal Inserts

The F-Series camera comes with two 3/4" NPT cable glands, each with a three hole gland seal insert. Cables may be between 0.23" to 0.29" OD. Typically up to five cables may be needed. Plugs are required for any insert hole(s) not being used. The photograph at the right shows two power cables, an Ethernet cable, a serial control cable (no analog video is installed), and two gland seal plugs.

If non-standard cable diameters are used, you may need to locate or fabricate the appropriate insert to fit the desired cable. FLIR Commercial Systems, Inc. does not provide cable gland inserts other than the inserts supplied with the system.
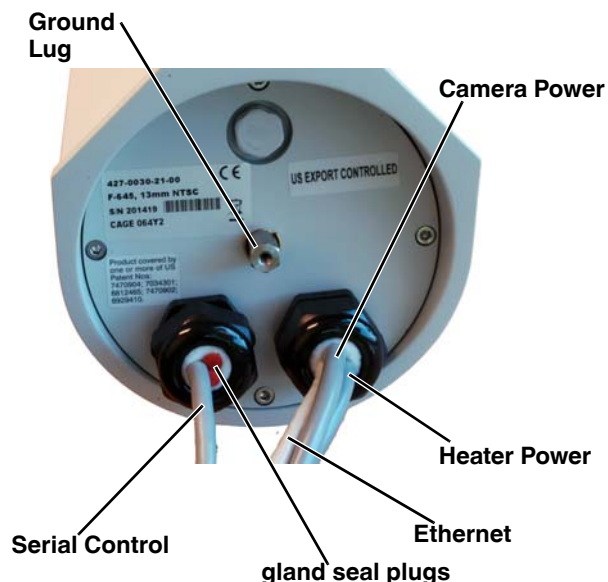
Note

> Insert the cables through the cable glands on the enclosure before terminating and connecting them. In general, the terminated connectors will not fit through the cable gland. If a terminated cable is required, you can make a clean and singular cut in the gland seal to install the cable into the gland seal.

1.6   Camera Connections

Connections for Serial, Video, Ethernet, and Power
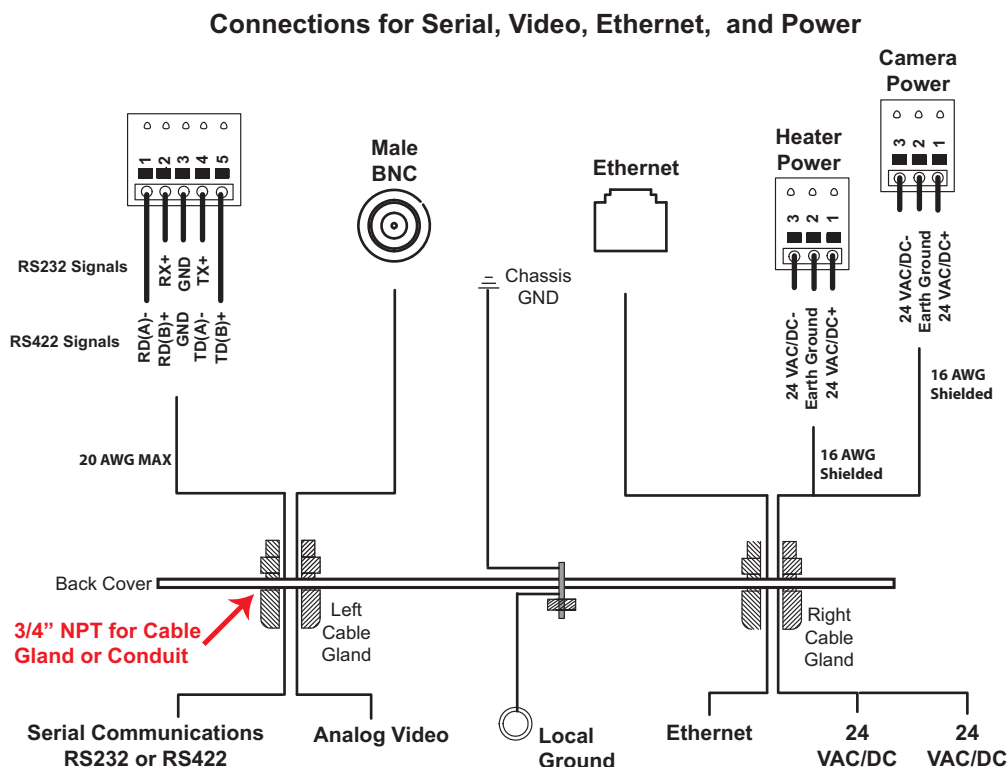
Figure 1-3: Camera Connections

1.6.1   Connecting power

The camera itself does not have an on/off switch. Generally the F-Series camera will be connected to a circuit breaker and the circuit breaker will be used to apply or remove power to the camera. If power is supplied to it, the camera will be in one of two modes: Booting Up or Powered On.

The power cable supplied by the installer must use wires that are sufficient size gauge (16 AWG recommended) for the supply voltage and length of the cable run, to ensure adequate current carrying capacity. Always follow local building codes.

Ensure the camera is properly grounded. Typical to good grounding practices, the camera chassis ground should be connected to the lowest resistance path possible. FLIR requires a grounding strap anchored to the grounding lug on the back plate of the camera housing and connected to the nearest earth-grounding point.

Note

The terminal blocks for power connections will accept a maximum 16 AWG wire size.

Serial Connector
for local control

Not used

Analog Video

Camera Power

Heater Power

IP Network

Analog Video
(monitoring output only)

Figure 1-4: Connector and DIP Switch locations

1.6.2   Video Connection

The analog video connection on the back of the camera is a BNC connector. The camera also provides an RCA video connector that can be used to temporarily monitor the video output, without disconnecting the BNC connection.
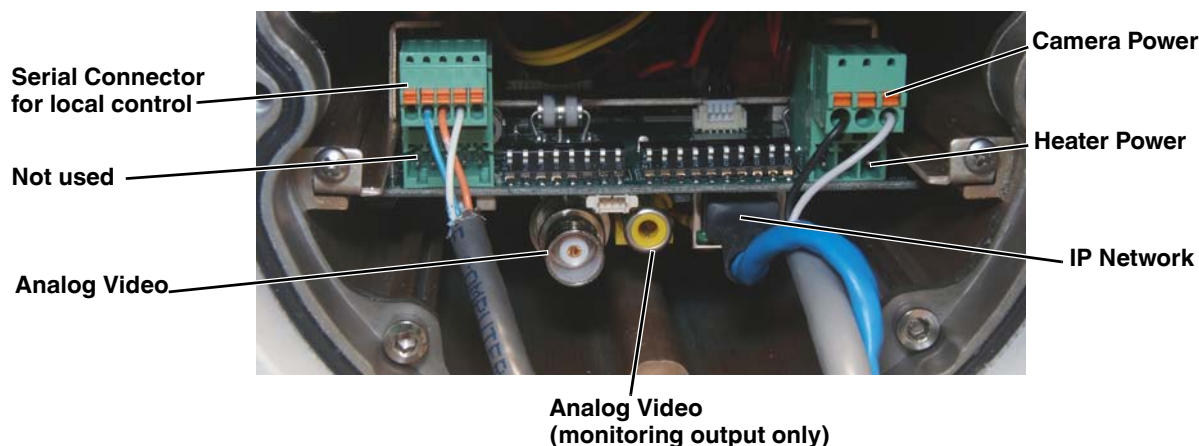
The video cable used should be rated as RG59U or better to ensure a quality video signal.

1.6.3   Ethernet Connection

The cable gland seal is designed for use with Shielded Category 6 Ethernet cable.

1.6.4   Serial Connection

For serial communications, it is necessary to set the parameters such as the signalling standard (RS-232 or RS-422), baud rate, number of stop bits, parity and so on. It is also necessary to select the communication protocol used (either Pelco D or Bosch) and the camera address. By default, the serial interface uses Pelco D, RS-422 standard, 9600 baud rate, 8/1/none, and address 1.

Note

Typical Bosch systems operate using a biphase connection and the FLIR cameras do not accept biphase signals directly. It may be necessary to install a biphase converter in order to use the Bosch protocol.

Connect the wires of the serial cable as show in Figure 1-3 on page 1-6. When using the RS-422 standard, ensure the transmit pair of the camera goes to the receive pair of the other device, and vice versa.

Note

The terminal blocks for serial connections will accept a maximum 20 AWG wire size.

1.7   Serial Communications Overview

The installer must decide if the serial communications settings will be configured via hardware (DIP switch settings) or software. If the camera has an Ethernet connection, then generally it will be easier (and more convenient in the long run) to make configuration settings via software. Then configuration changes can be made over the network without physically accessing the camera. Also the settings can be saved to a file and backed up or restored as needed.

If the camera is configured via hardware, then configuration changes in the future may require accessing the camera on a tower or pole, dismounting it, and removing the back and so on. If the camera does not have an Ethernet connection, the DIP switches must be used to set the serial communication options.

Note

The serial communications parameters for the F-Series camera are set or modified either via hardware DIP switch settings or via software, through a web browser interface. A single DIP switch (SW102-9), Software Override determines whether the configuration comes from the hardware DIP switches or the software settings.

Note

The DIP switches are only used to control serial communications parameters. Other settings, related to IP camera functions and so on, must be modified via software (using a web browser).

1.7.1   Serial Communications Settings - Hardware DIP Switches

The camera has two blocks of DIP switches that are used to configure the serial communications settings. One block of switches has 8 switches and is used to set the serial address (or ID) of the camera. The other block of switches has 10 switches and is used to set baud rate, hardware protocol (RS-232 or RS-422), serial protocol (Pelco D or Bosch), and Software Override.

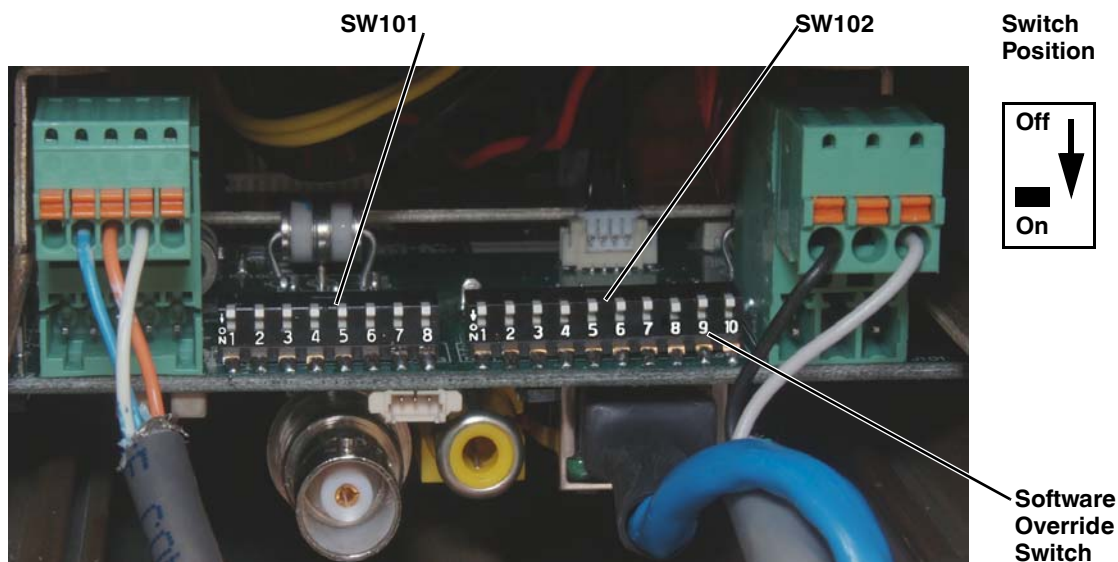The figure below shows the locations of dip switches SW101 and SW102.

Figure 1-5: F-Series Camera Configuration

If the Software Override DIP switch is set to the software position (as it is by default), all of the other DIP switches will be ignored, and configuration changes must be made through software. If the switch is set to the hardware position, all configuration settings related to serial communications are made with the DIP switches, and changes that are made via software (with a web browser) will be ignored.

The following image shows the factory default settings, with address 1, 9600 baud, Pelco D, RS-422, Software Override set to software:
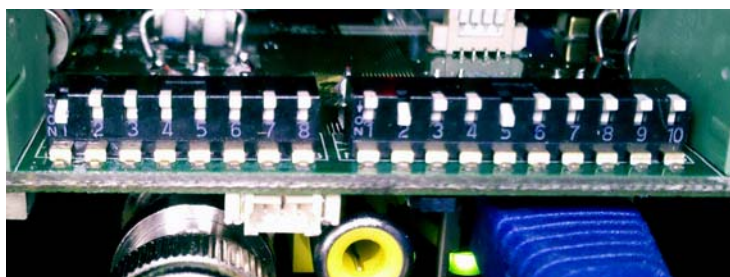
Serial Address: Use the block of switches on the left (SW101) to set the serial address of the camera. The available range of values is from decimal 1 to 255. The dip switches are interpreted as a binary number, with switch 1 representing the least significant bit (the switches are in the reverse order of the bits). For convenience, a table of serial addresses and their binary equivalents is included at the end of the manual. See "Serial Address: Decimal To Binary Conversion" on page 3-1.

Table 1-1: Dip Switch Address/ID Settings—SW101

ID	Sw 1 LSB	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7	Sw 8 MSB
1	On	Off	Off	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off	Off	Off
3	On	On	Off	Off	Off	Off	Off	Off
…	…	…	…	…	…	…	…	…
255	On	On	On	On	On	On	On	On

Other Serial Communication Parameters: The tables below defines the switch locations, bit numbering and on/off settings used in controlling the other serial communication parameters.

Table 1-2: Dip Switch Settings—SW102

		Settings		Description
Baud Rate: This is the baud rate of the system user serial port. The available values are 2400, 4800, 9600, 19200 kbaud.		**Bit 1**	**Bit 2**	
		Off	Off	2400
		On	Off	4800
		Off	On	9600
		On	On	19200

Table 1-2: Dip Switch Settings—SW102

	Settings		Description
Camera Control Protocol: This is the communication protocol selected for the system when operating over the serial port. The available protocols are Pelco-D and Bosch.	**Bit 3**	**Bit 4**	
	Off	Off	Pelco-D
	On	Off	NA
	Off	On	Bosch
	On	On	NA
Serial Communication Standard: This determines the electrical interface selected for the user serial port. The available settings are RS422 and RS232.	**Bit 5**	**Bit 6**	
	Off	Off	NA
	On	Off	RS422
	Off	On	RS232
	On	On	NA
Not Used	**Bit 7**	**Bit 8**	
	X	X	
	X	X	
	X	X	
	X	X	
Software Override DIP Switch: This setting determines whether the system will use software settings for configuration or if the dip switch settings will override the software settings. Default is Off.	**Bit 9**		
	Off		Software select
	On		Hardware select
Not Used	**Bit 10**		
	X		

1.8   F-Series Camera Specifications

THERMAL CAMERA SPECS

	160 x 120	320 x 240	640 x 480
Resolution	160 x 120	320 x 240	640 x 480
Detector Type	Long-Life, Uncooled VOx Microbolometer		
Pixel Pitch	25 μm	25 μm	17 μm
Focal Length (lens/model dependent)	9 mm, 13 mm, 19 mm	9 mm, 13 mm, 19 mm, 35 mm, 65 mm, 100 mm	13 mm, 25 mm, 35 mm, 50 mm, 65 mm, 100 mm
Field Of View (lens/model dependent)	24° × 20° (F-124; 9 mm) 17° × 14° (F-117; 13 mm) 12° × 10° (F-112; 19 mm)	48° × 39° (F-348; 9 mm) 34° × 28° (F-334; 13 mm) 24° × 19° (F-324; 19 mm) 13° × 10° (F-313; 35 mm) 7° × 5° (F-307; 65 mm) 4.6° × 3.7° (F-304; 100 mm)	45° × 37° (F-645; 13 mm) 25° × 20° (F-625; 25 mm) 18° × 14° (F-618; 35 mm) 12° × 10° (F-612; 50 mm) 10° × 8° (F-610; 65 mm) 6.2° × 5° (F-606; 100 mm)
Zoom (model dependent)	2× E-zoom	2× & 4× E-zoom	2× & 4× E-zoom
Spectral Range	7.5 μm to 13.5 μm		Continuous e-zoom on F-6xxE models
Focus Range	Athermalized, focus-free		

OUTPUTS

Composite Video NTSC or PAL	Standard
Video Over Ethernet	Two independent channels of streaming MPEG-4, H.264, or M-JPEG

CONTROL

Point To Point (stand alone)	Standard
Ethernet	Standard
Serial	RS-232/-422; Pelco D, Bosch
Network Enabled	Standard

GENERAL

Weight	9.5 lb (configuration dependent)
Dimensions (L,W,H)	18.1" × 5.5" × 6.3" (460 mm × 140 mm × 160 mm)
Power Requirements	24 VAC (21-30 VAC) 24 VDC (21-30 VDC)
Power Consumption	24 VAC: 15 VA max no heater, 51 VA max w/heater 24 VDC: 10 W max no heater, 46 W max w/heater
Inrush Current	<5 A for DC power supply with slew rate > 10 ms <19 A for AC power supply with slew rate > 4.17 ms

ENVIRONMENTAL

Dust, Water Protection Rating	IP66
Operating Temperature **Cold start**	-50°C to +70°C (-58°F to +158°F); -40°C to +70°C (-40°F to +158°F)

Note

Power consumption is independent of the input voltage when the heater is off. The power drawn by the heaters increases with the input voltage to a maximum at 30 Volts.

2   Basic Operation and Configuration

This chapter provides basic information on how to operate a new camera that has not yet been configured. A bench test can be used to verify camera operation before the camera is configured for the local network. This chapter also provides basic configuration information.

2.1   Nexus IP Camera

TheF-Series camera is an IP camera with Nexus capabilities, which means there is a microprocessor inside that runs the Nexus Server software. The Nexus Server provides a number of services, including camera control, video streaming, and geo-referencing capabilities. The Nexus communications protocol is an open, standards-based protocol that allows the server to communicate with a video management client, such as FLIR Sensors Manager or with a third-party ONVIF-compatible VMS client.

There are two main components to the Nexus Server software. One is a web server known as the web tool or web interface that listens on the network for web browser requests, and is used for the initial (and perhaps ongoing or occasional) configuration changes to the server. The latest release of the web tool also allows the user to view video and to operate the camera.

The other process, known as the Nexus Server, listens on the network for connections from clients such as FSM or other VMS clients. These clients are used to control the camera and stream video during day-to-day operations of the camera.

2.1.1   Nexus Server Configuration

In general, it may be necessary for the installer to make a limited number of configuration changes for each server, such as setting the serial and/or IP communication parameters. For example, each camera comes from the factory with the same default IP address, so adding more than one camera to an IP network requires each camera to be configured with a different IP address, at a minimum. On the other hand, many of the configuration parameters will remain unchanged from the factory default settings.

In order to control the camera, it is necessary to communicate with it either using serial communications (RS-232 or RS-422), or over Ethernet using Internet Protocol (IP). In either case, it is likely there are some communication parameters that are specific to each installation.

2.1.2   Serial and/or IP Communications

For a camera that is installed in a legacy-type CCTV network using analog video, the camera may commonly be controlled with serial communications. The serial cable from the camera will be connected to a keyboard/joystick device, or to a video switch, encoder, or DVR that has a serial communication port. In this case the installer may want to configure parameters such as the address of the camera, the baud rate, and so on. On Nexus IP cameras that support serial communications, these parameters can be set through software using a web browser.

For a camera installed in an IP network, the camera will commonly be controlled over Ethernet by a PC or laptop running FLIR Sensors Manager (FSM) or a third-party Video Management System (VMS) software. FSM is an integral part of the Nexus architecture—it is a client program that communicates with the Nexus Server on the camera. It allows control of the camera and video streaming and many other sophisticated functions.

In many cases, a camera will be installed with both serial and Ethernet communications. As such, the camera can be controlled by means of a serial device or through software. When someone tries to control the camera with a serial device at the same time as someone does through the software IP interface, the serial device takes priority.

Not all parameter settings are described in this manual. If you need help during the configuration process, contact your local FLIR representative or, call 888-747-3547 inside the US.

2.1.3   Serial Communications

Cameras that have a serial interface support a limited set of pan/tilt/zoom and focus commands over RS-422 or RS-232 serial communications using common protocols (Pelco D or Bosch). By default, the camera is configured for RS-422 standard, 9600 Baud, 8 bits, no parity, 1 stop bit, using the Pelco D protocol, and address 1.

2.1.4   Ethernet Communications

The camera has an Ethernet connection that allows streaming video over an IP network as well as configuration and control of the camera[1]. It is possible to stream video and control the camera as it is from the factory, without making any configuration changes. However in most cases the camera will have at least some configuration changes to allow it to connect with other devices on the existing network.

Once the camera is connected to a network and powered on, the user can choose to use either a web browser[2] or the FLIR Sensors Manager (FSM) software to view the video and control the camera. The FSM software is included with the camera and can be run under Microsoft Windows. Refer to the *FSM User Manual* for details about using the software; the manual is available from the Windows Start menu once the software is installed.

With the latest version of camera firmware, a web browser can be used to operate the camera (view video, pan/tilt/zoom, and so on) and it can be used to make configuration changes. This manual has basic configuration information; refer to the *Nexus IP Camera Configuration Guide* (FLIR Doc. 427-0030-00-28) for more details about camera configuration.

If the camera will be controlled only through serial communications, it may still be necessary to connect it to an IP network, at least temporarily, to adjust any of the serial communications settings. By default, the serial interface uses the Pelco D protocol, RS-422 standard, 9600 baud rate (8/none/1), and address set to 1. Refer to the *Nexus IP Camera Configuration Guide* for information on changing these parameters.

Getting the camera IP interface set up and working may require a level of familiarity with managing IP networks that is new to many security professionals. Prior to configuring the IP interface and streaming video parameters, make sure you know how to manage and configure the other equipment in the network (for example, any PC or device that will connect to the camera, any router or firewall that will carry the IP traffic, and so on). FLIR technical support can only provide limited support in this regard.

2.2   Bench Test

Since the camera offers both analog video and IP video, there are several ways to bench test the camera. It is recommended the installer should test the camera using the same type of connections as the final installation.

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1. For this chapter, it is assumed the camera will be connected to a network via Ethernet. For installations that use only analog video output, it is not possible to make configuration changes unless an Ethernet connection is also used.
2. The web interface is supported on Microsoft Internet Explorer version 9, as well as the latest versions of Google Chrome and Mozilla Firefox®.

Even if using analog video and serial communications in the final installation, it is a good idea to test the IP communications when performing the bench test. If any image adjustments are necessary, they can be done using a web browser over the IP connection, and saved as power-on default settings.

With the camera powered up, analog video can be tested at the BNC connectors. Connect the camera video output to a video monitor and confirm the live video is displayed on the monitor.

If using serial communications, connect the serial cable from the camera to a serial device such as a keyboard, and confirm that the camera is responding to serial commands. Before using serial communications, it may be necessary to configure the serial device interface to operate with the camera. When the camera is turned on, the video temporarily displays system information including the serial number, IP address, Pelco address, and the Baud rate. For example:
S/N: 1234567
IP Addr: 192.168.250.116
PelcoD (Addr:1): 9600 SW

2.2.1   Test and Configuration Steps

Assuming the existing network uses IP addresses that are unique and different than the default address on the camera, configuring the camera for IP communications generally involves the following steps:

Step 1   Connect the Ethernet port to an IP network that is isolated from the existing camera network (for example, a standalone switch)

Step 2   Connect a PC or laptop to the same network

Step 3   Temporarily set the IP address of the PC or laptop to be compatible with the factory network address of the camera (for example, 192.168.250.1)

If you are unsure how to set the IP address on the PC or laptop, refer to section 2.11 "Setting the IP address on a Windows PC" on page 2-24.

Step 4   Perform a bench test of the camera using FSM, prior to making any parameter changes (this step is optional but recommended)

Step 5   Using a web browser, configure the camera settings, such as IP address, camera date/ time, and other parameters, so the camera is compatible with the existing network equipment

Step 6   Save the configuration changes and restart the server

Step 7   Connect the camera to the existing network and test the camera

Step 8   Make a backup of the new configuration

2.3   Web Browser Interface

Use a web browser to connect to the camera as described below, and confirm it is streaming video. Once the bench test is complete, use the web browser to make configuration changes as needed (for example, set the IP address to an address that is compatible with the existing network). It is also a good idea to run the FSM software and confirm it is working with the camera as expected.

It is possible to log into the camera using one of three User Names: **user**, **expert**, and **admin** (the corresponding passwords by default are **user**, **expert**, and **fliradmin** respectively). The **user** login can be used to do the initial bench test of the camera. The **admin** login must be used to make configuration changes such as setting the IP address. The login passwords can (and should) be changed by the system administrator to prevent unauthorized access. For information on how to change the passwords, refer to section 2.6 "Maintenance Menu" on page 2-11.

2.3.1   Log into the Camera Web Page

Step 1   Open a web browser and enter: http:\\192.168.250.116. The login screen with a picture of the camera will appear.

Step 2   Enter **user** for the User Name and **user** for the Password, and click Login.
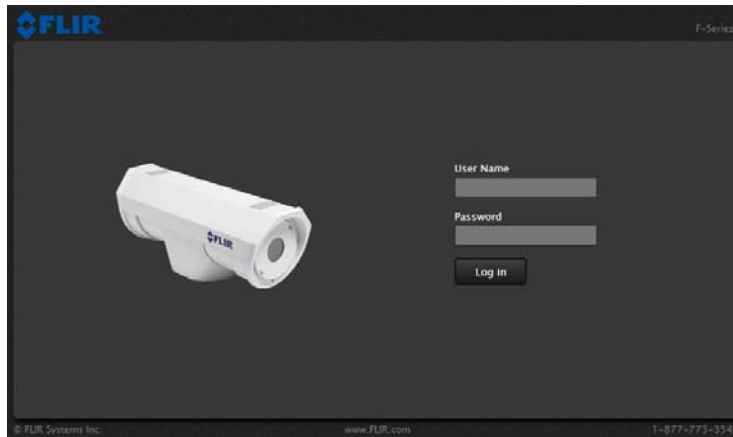
The **Live Video** page will be displayed, with a live image from the camera on the left part of the screen. Next to the FLIR logo along the top of the screen are some menu choices, including **Live Video** (the red text indicates it is selected), **Help** and **Log Off**.

On the right side are some control buttons, and possibly an image of a joystick (if the camera has pan/tilt capability).
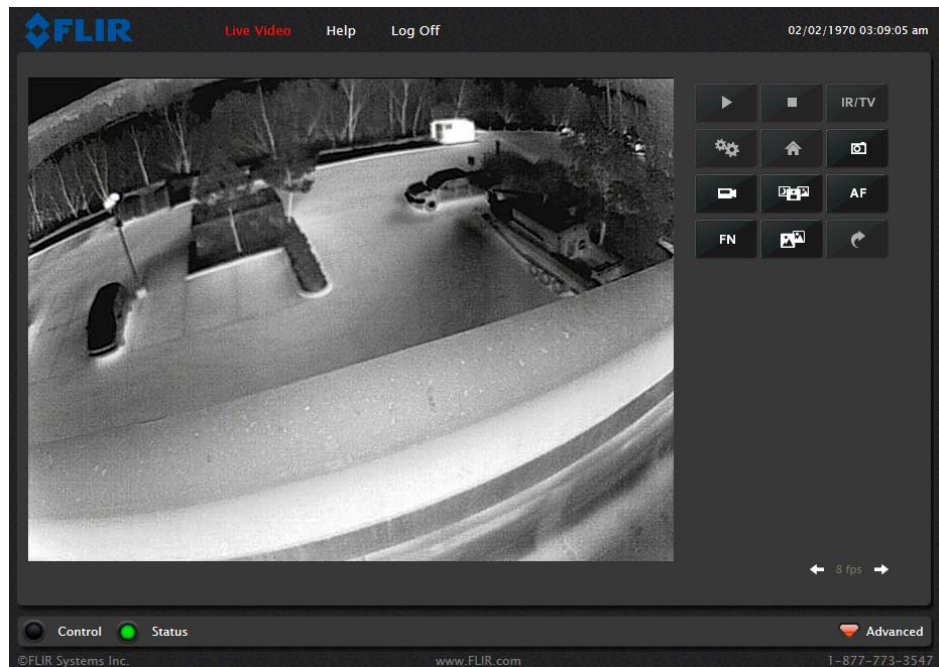

Figure 2-2: Camera Web Page Login Screen

If the live video is not displayed, refer to section 2.8 "Troubleshooting Tips" on page 2-18. In the lower right of the web page there is a frame rate selector. This selector allows the user to change the rate at which the frames are displayed in the browser. This rate controls the user's own web browser only, and does not affect the video streams to other users or to an NVR.

Note

Before making any configuration changes, it may be wise to back up the existing configuration. Refer to section 2.6.4 "Configuration File" on page 2-15 for information about the configuration file.

2.3.2   Camera Control and Status

In the lower left of the screen are two indicator "lights": Control and Status. Initially the Control light is off, as in the image above, indicating the user is not able to control the camera immediately. When multiple users are connected to a camera, only one user at a time can issue commands to the camera. If another user has control of the camera, the Control light is yellow.
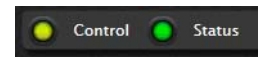
A user is able to request control of the camera by clicking on the yellow or black "light", or simply by sending a command to the camera. For example, move the cursor over the video and select the "Zoom In" control (magnifying glass with "+") that appears in the lower left of the screen. The Status light may turn off temporarily while waiting for the response from the camera. After a short pause, the Control light should turn green. Observe what happens to the image when the "Zoom In" control is clicked several times. Be patient, there may be a slight delay between each command while the browser waits for a response from the camera.
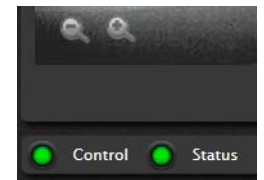
If a command is sent to the camera when the user does not have control, the command will not be executed, and it is necessary to send the command again once the light is green.

2.3.3   Web Control Panel

The control buttons on the right side of the page provide a way to control the camera. When the mouse cursor is positioned over a button, a screen tip is displayed which explains the function of the button.

This same web interface is used with various FLIR thermal cameras; some are fixed mount cameras, such as the F-Series and FC-Series S cameras, and some have pan/tilt capabilities, such as the PT-Series and D-Series. As a result, some buttons appearing in the control panel may be disabled if they do not apply to the camera in use.

Save Snapshot

This button allows the user to save an image as a .jpg file. The destination folder for the image is determined by the web browser that is used.

Perform IR NUC Calibration

This button causes the camera to perform a Non-Uniformity Correction operation (refer to the section "Image freezes momentarily" on page 2-18).

Toggle Scene Preset

This button causes the camera to cycle through 5 different image settings. The Scene Presets cause the image brightness and contrast to adjust. Depending on the time of day, weather, and other conditions, one Scene Preset may be preferable to the others.

Toggle Polarity

This button changes the way various objects are displayed in the image, with hot objects displayed as white and cold objects as black, or vice versa.

Function

Some cameras have additional features or functions which can be accessed using an extra numeric function keypad. It is possible to create customized camera functions through a "macro" interface which can be programmed through XML commands. For additional information contact FLIR Technical Support for information about the Nexus XML-Based Control Interfaces.

When the Function button is selected, the keypad changes to a numeric keypad. As digits are selected, they are displayed below the keypad. To execute the function, select the FN Function button again.

If an invalid function is entered, an error message appears below the video window ("Function is not available in current mode."). To return to the Control Panel, select the Back button (left arrow).

Other buttons on the control panel may be disabled if not available for the camera. In the control panel, a disabled button is indicated with a grey color and when the cursor is positioned over a disabled button, the screen tip indicates the function is not available.
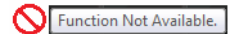
2.3.4   Help

At the top of the page, select the **Help** menu to display software version information. This page has information about the camera including hardware and software revision numbers, part numbers, and serial numbers. If it is necessary to contact FLIR Technical Support for assistance, it will be helpful to have the information from this page (such as Software Version) on hand.

2.3.5   Log Off

Use the **Log Off** menu entry to disconnect from the camera and stop the display of the video stream.

2.4   Bench Test Using FSM

IF FSM is to be used in the final installation, it is a good idea to perform a bench test with it, as described below, prior to making configuration changes. The FSM software is included with the camera; the software installation will begin automatically when the CD is inserted into the PC. Once the bench test is complete, use a web browser to make configuration changes as needed (for example, set the IP address to an address that is compatible with the existing network).

The following provides a brief description of how to use FSM to control a camera and stream video from the camera. For more detailed information on how to use FSM, refer to the *FLIR Sensors*

Manager User Manual. Once the software is installed, the manual is available from the Windows Start Menu. If the FSM software has not been installed yet, locate the CD that came with the camera and install it on the PC. The latest version of the software is also available from http://support.flir.com/ in the Downloads page.

2.4.1   Running FSM

Run the FSM software by double clicking the FLIR Sensors Manager icon on the desktop, or click on the Windows Start button and select Programs > FLIR Sensors Manager > FLIR Sensors Manager.

Initially the FLIR Sensors Manager splash screen will be displayed. After a brief while, the FSM main window will appear. A popup FSM Notification window will appear in the lower right of the screen indicating that no cameras (servers) have been discovered yet.

Click on the Accept button to acknowledge the notification.

The FLIR Sensors Manager uses a "client/server" architecture. The FSM software is considered a client, and the cameras are considered servers or sensors. The Sensors Panel in the upper left of the window indicates no sensors have been discovered and added to the list of Active Sensors.
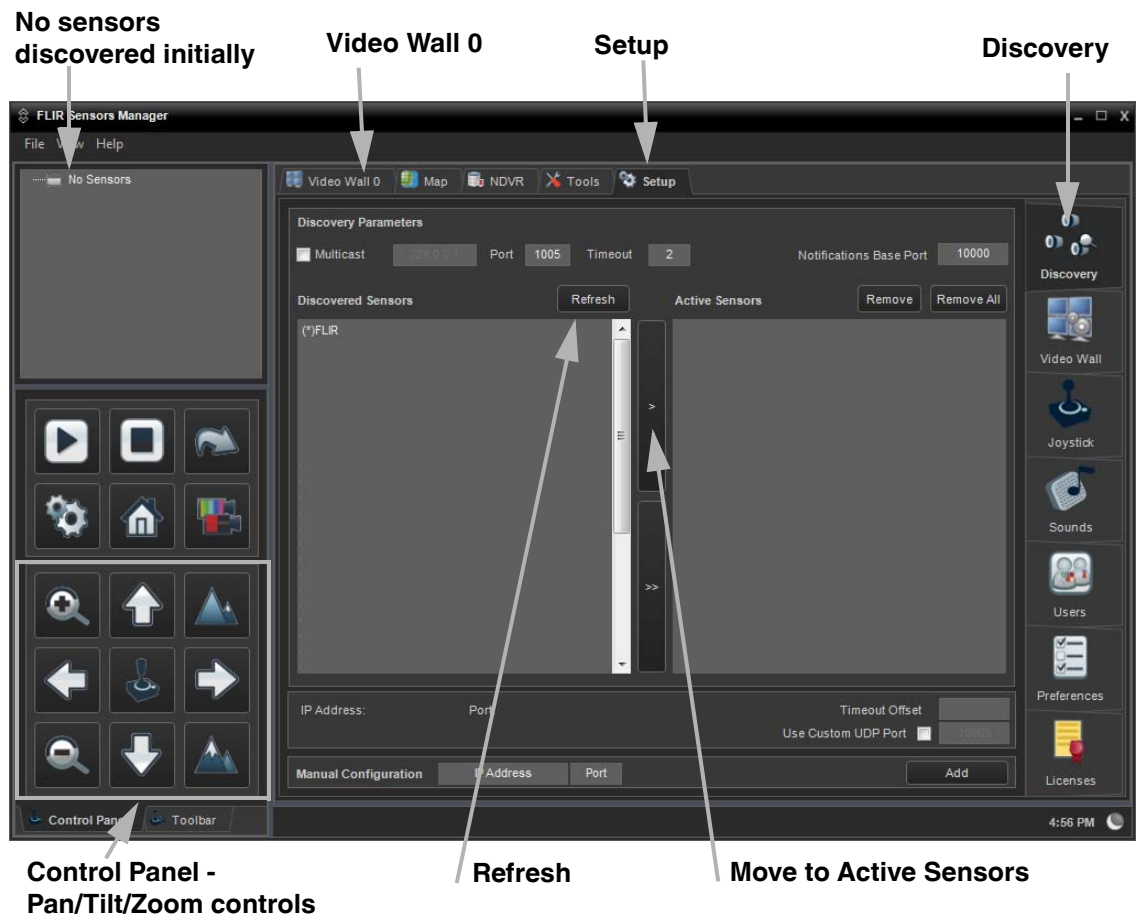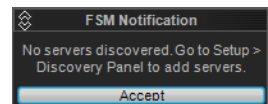
Click on **Setup**, if required, then the **Discovery** button on the side panel to bring up the Discovery Panel. The FSM software can automatically discover FLIR cameras on the network.

When the Discovery Panel is displayed, click **Refresh**. The FLIR camera will appear in the list of Discovered Sensors. The camera will be called "FLIR", and the asterisk in parenthesis "(*)" indicates the camera has not been added to the list of Active Sensors on the right.

Click on the center bar ">" to move the camera over to the list of Active Servers. The name of the camera should appear in the Sensors Panel, with a green joystick icon.
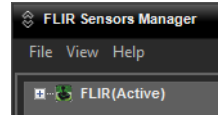
By default, the FSM software will automatically discover sensors in the network, connect to the first camera it finds, take control of the camera, and display the video from the camera in Video Wall 0.

Click on **Video Wall 0** and confirm that video is streamed to the monitor and it is possible to control the camera using the pan/tilt/zoom controls in the **Control Panel**. For example, click on the zoom button (magnifying glass with +), and the video will zoom to 2X. Once operation of the camera has been confirmed, the camera can be configured to an IP address that matches the installation network.

2.5   Basic Camera Configuration

The following procedures describe how to do the most common basic camera configuration steps, such as setting the camera IP address and hostname and changing the user passwords. To make these changes, it is necessary to login using the **admin** user account.

Note

> In most installations, the only camera settings needed are available from the Live Video page (using Scene Presets or Polarity). Use caution when modifying the camera settings described in this section. Some settings may adversely affect the thermal image over time or may completely disable the camera or the network interface.

2.5.1   Expert and Admin Accounts
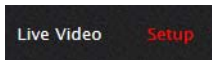
When a user logs in as **expert**, an additional menu called **Setup** is available. The **Setup** menu can be used to make advanced adjustments to the thermal camera. For a pan/tilt camera, it can also be used to make configuration changes to the daylight camera and the pan/tilt platform. These adjustments should only be made by someone who has expertise with thermal cameras and a thorough understanding of how the various settings affect the image. Haphazard changes can lead to image problems including a complete loss of video.
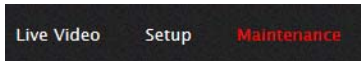
When a user logs in as **admin**, a third menu called **Maintenance** is available. It is possible to use settings on the **Maintenance** menu to modify the network settings, including the IP address of the camera. It is also possible to use the **Maintenance** menu to change the login passwords. The **Maintenance** menu also provides access to many other configuration options.
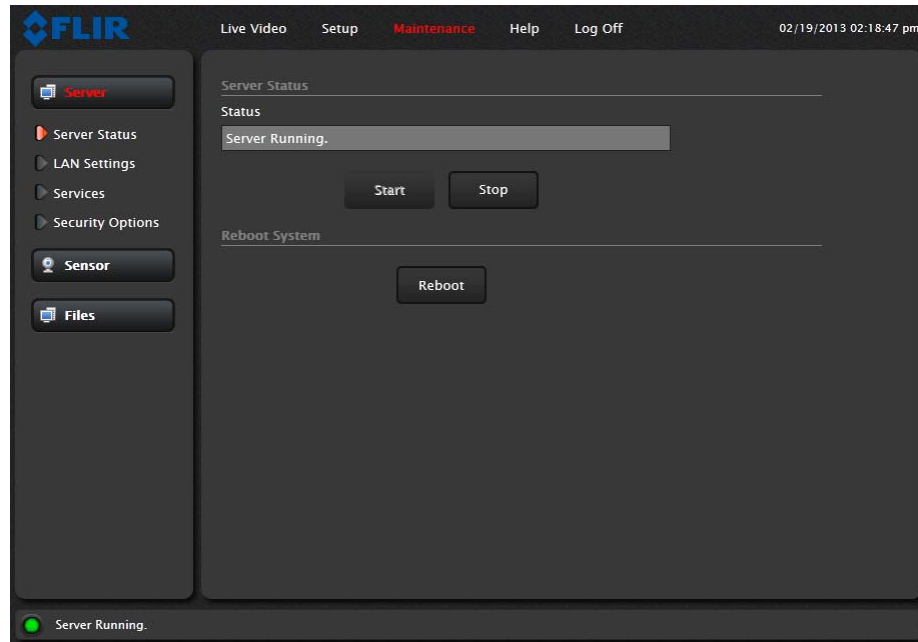
2.6   Maintenance Menu

Initially, when the **Maintenance** page is selected, the **Server Status** page is displayed. The page provides an indication of the current server status (either running or stopped) and buttons for starting or stopping the server or for rebooting the system.

Note, In order to make some configuration changes through the **Maintenance** menu, it is necessary to save the changes, then stop and restart the server to make the changes take effect.

The basic camera configuration steps are accessed through the **Maintenance** menu, using the **Server** submenu on the left side of the page.The **LAN Settings**, **Services**, and **Security Options** selections are described below. Generally with these settings it is necessary to save the changes to make them effective, but it is not necessary to stop and restart the server.

Step 1   If you are logged into the Nexus Server User account, select Log Off or direct your web browser to: http:\\192.168.250.116.

Step 2   Enter **admin** for the User Name and **fliradmin** for the Password, and click Login.

Step 3   Select **Maintenance** from the top menu. The following **Server Status** page appears.

2.6.1   LAN Settings

The **LAN Settings** page can be used to set the hostname, default gateway, and IP address for the camera. The default IP Address mode is static; the mode can also be set to DHCP.

Once the IP address of the camera is changed, the PC may no longer be on the same network and therefore may not be able to access the camera until the IP address on the PC is changed also. For that reason, you may wish to change the IP address after making other configuration changes.

When the LAN settings are changed and the Save button is clicked, a pop-up message will appear to indicate the network interface should be restarted. Once all the changes have been made and saved, click on the **Restart Network** button at the bottom of the page.
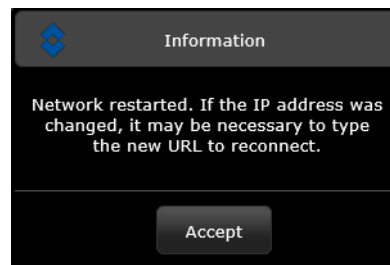
If the Hostname is changed, the new name may not show up in FSM until the camera is rebooted. To reboot the camera, save any configuration changes, then select Server Status and click the Reboot button.

Note

The IP address is temporarily displayed on the video for a short while after the camera boots up. If you are unsure what the camera IP address is set to, it may useful to reboot the camera and watch for the IP Address information after the camera boots up.

To reset the IP address (and other configuration settings and login passwords) to the factory default, refer to section 2.10 "Restoring the Factory Settings" on page 2-23.

2.6.2   Services (Date and Time Settings)

The **Services** page is used to configure the date and time settings. The date, time, and time zone can be obtained from an NTP server, or can be entered manually. If the NTP mode is selected, the NTP server information can be entered. The NTP server address can be entered as a static address or can be obtained via DHCP.

If the Custom mode is selected, a pop-up window allows the information to be entered manually.

Set the date and time parameters, then select the Save button at the bottom.

2.6.3 Security Settings

To maintain security of your systems set passwords for each of the three login accounts.
user —The user account can only use the **Live Video** screen and controls.
expert —The expert account can use the **Live Video** screen and the camera **Setup** screen.
admin —The admin account can use all screens

After each password is set and confirmed, select the Save button at the bottom (it may be necessary to scroll down the page).

Note, as an additional security measure, it is possible to limit which computers have access to the web browser interface. At the top of the page under "Restrict Web Configuration", add a computer's IP address and click "Add". After all the allowed IP addresses are entered, select the Save button to save the changes. Note, once one or more addresses has been added to this list, **only** these computers will be able to log in to the web interface. Be sure to remember which addresses are allowed.

It is also possible to limit access to the camera from a client program (such as FSM) by IP address. To do so, in the **Maintenance** menu select Sensor, then Networking. Set the "Allow anonymous clients" parameter to No, and then add in the allowed addresses in the Remote Clients list and click Save.

Note, once one or more addresses has been added to this list, **only** these computers will be able to access the camera as a client. Be sure to remember which addresses are allowed.

2.6.4   Configuration File

The **Configuration File** option on the **Files** web page allows the Nexus Server configuration to be displayed or backed up locally (on the camera). The configuration file can also be downloaded to another computer for backup, or a new configuration file can be uploaded from a computer to the camera. Shown at the top of the screen is the configuration script file in a scrollable window. This can be useful if you ever need help from a support engineer.

In the Custom Backup & Recovery section, click the Restore link associated with the factory.defaults configuration to restore the camera to its factory settings. This file can not be modified or deleted, so it is always available.

Use the Backup button to make a backup of your final settings. This will make a backup copy of the configuration file and store it locally on the camera. In the Upload & Download section, the Download Configuration File link can be used to save a copy to a PC for safe keeping. A pop-up window will ask for a file name and destination folder.

The Upload button is used to transfer a configuration file from a PC to the camera.

2.7   Thermal Imaging Overview

When power is applied to the F-Series camera, a FLIR splash screen is displayed for less than two seconds, and then the camera outputs the live video image. No operator action or intervention is required and no configuration of the camera is necessary.

The thermal camera makes an image based on temperature differences. In the thermal image, by default the hottest item in the scene appears as white and the coldest item is black, and all other items are represented as a grey scale value between white and black.

Figure 2-3: Splash Screen

It may take some time to get used to the thermal imagery from the camera, especially for someone who only has experience with normal daylight cameras. Having a basic understanding of the differences between thermal and daylight cameras can help with getting the best performance from the thermal camera.

Both thermal and daylight cameras have detectors (pixels) that detect energy. One difference between thermal and daylight cameras has to do with where the energy comes from to create an image. When viewing an image with an ordinary camera, there has to be some source of visible light (something hot, such as the sun or lights) that reflects off the objects in the scene to the camera. The same is true with human eyesight; the vast majority of what people see is based on **reflected** light energy.

On the other hand, the thermal camera detects energy that is **directly radiated** from objects in the scene. Most objects in typical surroundings are not hot enough to radiate visible light, but they easily radiate the type of infrared energy that the thermal camera can detect. Even very cold objects, like ice and snow, radiate this type of energy.

The camera is capable of sensing very small temperature differences, and produces a video image that typically has dramatic contrast in comparison to daylight cameras. This high contrast level from the thermal video enables intelligent video analytic software to perform more reliably.

The performance of the camera will likely vary throughout the day. Right after sunset, objects warmed by the sun will appear warmest. Early in the morning, many of these objects will appear cooler than their surroundings, so be sure to look for subtle differences in the scene, as opposed to just hot targets.

Originally developed for the military, thermal imaging cameras are now deployed in numerous commercial applications where it is impractical or too expensive to use active illumination (lights).

They are perfect for a wide variety of applications including transportation, maritime, security, fire fighting, and medical applications. The cameras often provide improved daytime viewing in environments where traditional video camera performance suffers, such as in shadows or backlit scenes.

The F-Series camera is a state-of-the-art thermal imaging system that will provide excellent night visibility and situational awareness, without any form of natural or artificial illumination. The system is easy to use, but it is useful to understand how to interpret what is displayed on the monitor.

While the imagery on the monitor may at first look similar to ordinary black and white daylight video, experience with the camera in varying conditions and seasons will lead to an appreciation of the characteristics that make thermal imaging distinct. A few tips on how to interpret some of the imagery may help you to make the most of your system.

The thermal camera does not sense light like conventional cameras; it senses heat or temperature differences. The camera senses small "differences" in apparent radiation from the objects in view, and displays them as either white (or lighter shades of grey) for warmer objects, and black (or darker shades of grey) for colder objects.

The thermal imaging camera relies on the fact that all objects, even very cold objects like ice, emit thermal energy in the portion of the infrared spectrum that this camera can "see", the long wave infrared (LWIR). Therefore, unlike an illuminated infrared camera, a thermal camera does not need an additional active illumination source, and creates video based on directly radiated rather than reflected energy.

This is why hot objects such as parts on an engines and exhaust pipes appear white, while the sky, puddles of water and other cold objects appear dark (or cool)[3]. Scenes with familiar objects will be easy to interpret with some experience. The camera automatically optimizes the image to provide you with the best contrast in most conditions.

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3. By default, the camera represents hot objects as white and cold objects as black. The camera can be set to use the Black Hot polarity setting, which displays hot objects as black and cold objects as white and is effectively the negative of White Hot polarity.

2.8   Troubleshooting Tips

If you need help during the installation process, contact your local FLIR representative or, call 877-773-3547 inside the US. FLIR Systems, Inc. offers a comprehensive selection of training courses to help you to get the best performance and value from your thermal imaging camera. Find out more at the FLIR training web page: http://www.flir.com/training.

Image freezes momentarily: By design, the camera image will freeze momentarily on a periodic basis during the Flat Field Correction (FFC) cycle (also known as Non-Uniformity Correction or NUC). Every few minutes, the image will momentarily freeze for a fraction of a second while the camera performs a flat field correction. A shutter activates inside the camera and provides a target of uniform temperature, allowing the camera to correct for ambient temperature changes and provide the best possible image. Just prior to the FFC, a small green square will appear in the corner of the screen.

Using FSM, it is possible to adjust the frequency of how often the FFC operation occurs. Using the Advanced Sensor Control, it is possible to change the FFC interval or to disable the automatic FFC entirely by setting it to Manual mode. For the best possible image, it is recommended the factory settings are used.

No video: If the camera will not produce an image, check the video connection at the camera and at your display. If the connectors appear to be properly connected but the camera still does not produce an image, ensure that power has been properly applied to the camera and the circuit breaker is set properly. If a fuse was used, be sure the fuse is not blown. If the video cabling is suspected as a possible source of the problem, plug a monitor into the RCA connection inside the camera and determine if it produces an image.

When the camera is powered on, it will do a NUC operation shortly after startup. If you are uncertain if the camera is receiving power, it may be useful to listen to the camera to hear if the click-click of the shutter mechanism can be heard. It may be only be possible to perform this test when the camera is on a work bench rather than in its installed position.

If the camera still does not produce an image, contact the FLIR dealer or reseller who provided the camera, or contact FLIR directly (contact information is provided on the rear cover of this manual).

Performance varies with time of day: You may observe differences in the way the camera performs at different times of the day, due to the diurnal cycle of the sun. Recall that the camera produces an image based on temperature differences.

At certain times of the day, such as just before dawn, the objects in the image scene may all be roughly the same temperature, compared to other times of the day. Compare this to imagery right after sunset, when objects in the image may be radiating heat energy that has been absorbed during the day due to solar loading. Greater temperature differences in the scene generally will allow the camera to produce high-contrast imagery.

Performance may also be affected when objects in the scene are wet rather than dry, such as on a foggy day or in the early morning when everything may be coated with dew. Under these conditions, it may be difficult for the camera to show the temperature the object itself, rather than of the water coating.

Unable To Communicate Over Ethernet: First check to ensure the physical connections are intact and that the camera is powered on and providing analog video to the monitor. When the camera is turned on, confirm the startup information is displayed on the analog monitor after approximately 90 seconds. For example:
```
S/N: 1234567
IP Addr: 192.168.250.116
```
Confirm that the IP address for the PC (for example, 192.168.250.1) is on the same network as the camera.

Next determine if Windows Personal Firewall is blocking the packets. You can turn off the firewall or add an exception for the FSM program. Typically when FSM runs for the first time, a pop-up notification may ask for permission to allow the FLIR Sensors Manager (fsm.exe) to communicate on the network. Select the check boxes (domain/private/public) that are appropriate for your network.
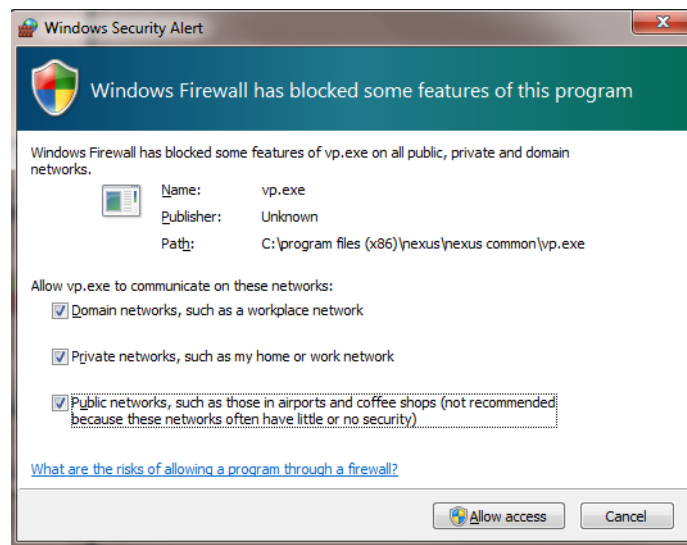

By default the camera will broadcast a "discovery" packet two times per second. When FSM starts up, it listens to the network for the discovery packets. If no cameras are listed in the Discovered Servers list, press the Refresh button. If the list is still empty, it indicates no discovery packets were received. This could be due to a wide variety of problems with the network, the PC, or the camera.

If necessary, use a packet sniffer utility such as Wireshark to capture packets and confirm the packets are being received by the PC from the camera.

Unable to control the camera: If the camera does not respond to commands from FSM (for example, the camera does not zoom when the zoom in button is clicked), the camera may not be the "Active" camera, or you may not have control of the camera. By default FSM will automatically request control of the camera and make it active, but if there are multiple cameras and/or multiple FSM clients, it may be necessary to manually make the camera active and take control of it.

Also, if the camera has a serial control interface connected to it, the serial device has the highest priority, and a command from the serial device can automatically take control of the camera away from any FSM client.

In the Sensors Panel, if the camera is the active sensor, there will be an "(Active)" notification next to the name of the camera. Only one camera or sensor can be active at a time. To make the camera active, right click on the icon to the left of the camera name and select "Set Active", or simply double-click on the icon.
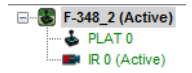
The icon to the left of the camera name indicates the status of the sensor. The following is a list of the possible icons and the meaning of each one.
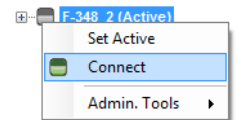
Connected and Controlled

This icon indicates the camera has been discovered and added to the list of active servers, and the camera is actively "connected" to the FSM client and receiving status updates. The joystick in the icon indicates the user has control of the camera. To release control of the camera, right click on the icon and select "Release Control".

Discovered

This icon indicates the camera has been discovered and added to the list of active servers, but the camera is not actively "connected" to FSM, and therefore FSM is not receiving status updates. To connect to the camera, right click on the icon and select "Connect". Alternatively, it is possible to double-click the icon to connect.

Connected

This icon indicates the camera has been discovered and added to the list of active servers, and the camera is actively "connected" to FSM and receiving status updates. To take control of the camera, right click on the icon and select "Request Control". Alternatively, it is possible to double-click the icon to take control.
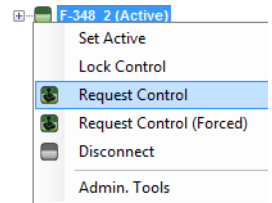
Not Connected

This icon indicates the camera has been discovered and added to the list of active servers, and FSM is trying to connect to the camera, but some kind of problem is preventing FSM from receiving status updates the camera. This could be do to a wide variety of problems in the camera, network or PC. Most often this situation occurs when a firewall allows certain packets (such as the discovery packets) but not others (the packets needed for a "connection").

2.9   General Errors

In the status bar at the bottom of the FSM screen there may be an indication that an error has occurred. When you position the cursor over the error icon (exclamation mark), the error will be displayed in a temporary pop-up. It is possible to view all the error messages by selecting the Tools tab at the top of he screen, and then select the Log button to the left.
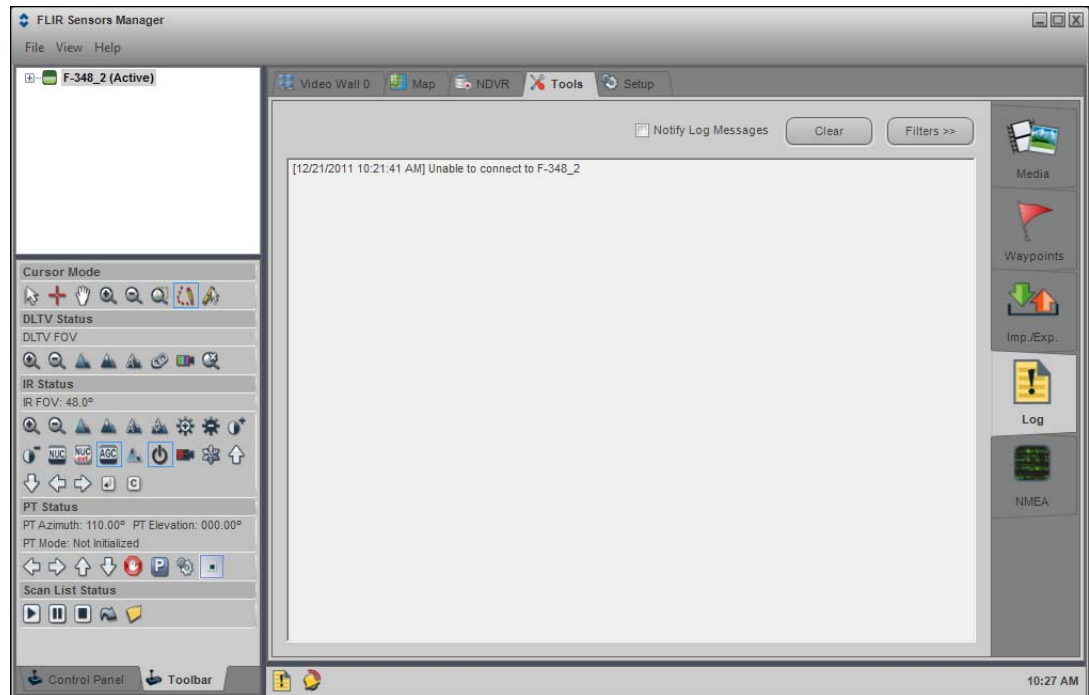
Unable to View Video Stream: If the video stream from the camera is not displayed in FSM, it could be that the packets are blocked by the firewall, or there could be a conflict with video codecs that are installed for other video programs.

When displaying video with FSM for the first time, the Windows Personal Firewall may ask for permission to allow the FLIR Video Player (vp.exe) to communicate on the network. Select the check boxes (domain/private/public) that are appropriate for your network.

If necessary, test to make sure the video from the camera can be viewed by a generic video player such as VLC media player (http://www.videolan.org/vlc/).To view the video stream, specify RTSP port 554 and the appropriate stream name such as "ch0". For example:

rtsp://192.168.250.116:554/ch0

Noisy image: A noisy image is usually attributed to a cable problem (too long or inferior quality) or the cable is picking up electromagnetic interference (EMI) from another device. Although coax cable has built-in losses, the longer the cable is (or the smaller the wire gauge/thickness), the more severe the losses become; and the higher the signal frequency, the more pronounced the losses. Unfortunately this is one of the most common and unnecessary problems that plagues video systems in general.

Cable characteristics are determined by a number of factors (core material, dielectric material and shield construction, among others) and must be carefully matched to the specific application. Moreover, the transmission characteristics of the cable will be influenced by the physical environment through which the cable is run and the method of installation. Use only high quality cable and ensure the cable is suitable to the marine environment.

Check cable connector terminations. Inferior quality connections may use multiple adapters which can cause unacceptable noise. Use a high-quality video distribution amplifier when splitting the signal to multiple monitors.

Image too dark or too light: By default the F-Series thermal camera uses an Automatic Gain Control (AGC) setting that has proven to be superior for most applications, and the camera will respond to varying conditions automatically. The installer should keep in mind that the sky is quite cold and can strongly affect the overall image. It may be possible to avoid a problem by slightly moving the camera up or down to include (or exclude) items with hot or cold temperatures that influence the overall image. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate.

Eastern or Western Exposure: Once installed, the camera may point directly east or west, and this may cause the sun to be in the field of view during certain portions of the day. We do not recommend intentionally viewing the sun, but looking at the sun will not permanently damage the sensor. In fact the thermal imaging camera often provides a considerable advantage over a conventional camera in this type of back-lit situation. However, the sun may introduce image artifacts that will eventually correct out. and it may take some time for the camera to recover. The amount of time needed for recovery will depend on how long the camera was exposed to the sun. The longer the exposure, the longer the recovery time needed.

Figure 2-4: Images facing sun from standard camera (left) and thermal camera (right)

2.10   Restoring the Factory Settings

The camera comes configured from the factory with default settings for the IP address (192.168.250.116), the login passwords, and all of the other configuration parameters (stored in a file called server.ini). In some cases, it may be necessary to restore the settings of the camera to the original factory settings. If necessary, this can be accomplished by temporarily connecting a loopback device to the Ethernet port during initial power-up. Approximately 30 seconds after power is turned on, the loopback should be removed to allow the camera to finish booting up.

Note

The camera will not finish booting up while the loopback device is connected to the camera. The camera will display analog video, but the Nexus Server will not start until the loopback is removed from the camera.

At each power-up, the system transmits a packet and then checks to determine if that same packet has been received. Detection of the received packet indicates the camera has a custom loopback connector installed on its Ethernet interface. The detection of the loopback packet cues the camera to restore Factory Defaults (including the IP settings, user passwords, and configuration file), reverting to the same configuration and behavior as when the camera left the factory.

The custom loopback connector is described below.

Pin #	Signal	Tied to pin #
1	Transmit +	3
2	Transmit -	6
3	Receive +	1
4	Unused	N/A
5	Unused	N/A
6	Receive -	2
7	Unused	N/A
8	Unused	N/A

The RJ45 loopback termination ties pin 1 to pin 3, and pin 2 to pin 6. The other pins are not connected. This type of device is available commercially (the Smartronix Superlooper Ethernet Loopback Jack and Plug is one example), or it can be easily made with an RJ45 plug, a couple wires, and a crimp tool.
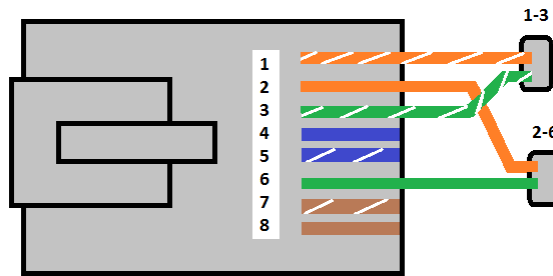
After the camera boots up, confirm the startup information is displayed on the analog monitor after approximately 90 seconds. For example:

```
S/N: 1234567
IP Addr: 192.168.250.116
PelcoD (Addr:1): 9600 SW
```

2.11   Setting the IP address on a Windows PC

To set the computer IP address in Windows, first connect the PC to a switch, or connect it to the camera and ensure the camera has power.

Step 1   With the PC or laptop connected to the switch (or if back-to-back with the camera, with the camera powered on), open the Control Panel, Network and Sharing Center (a Windows 7 example is shown). The connection to the camera should show in your Active Networks.
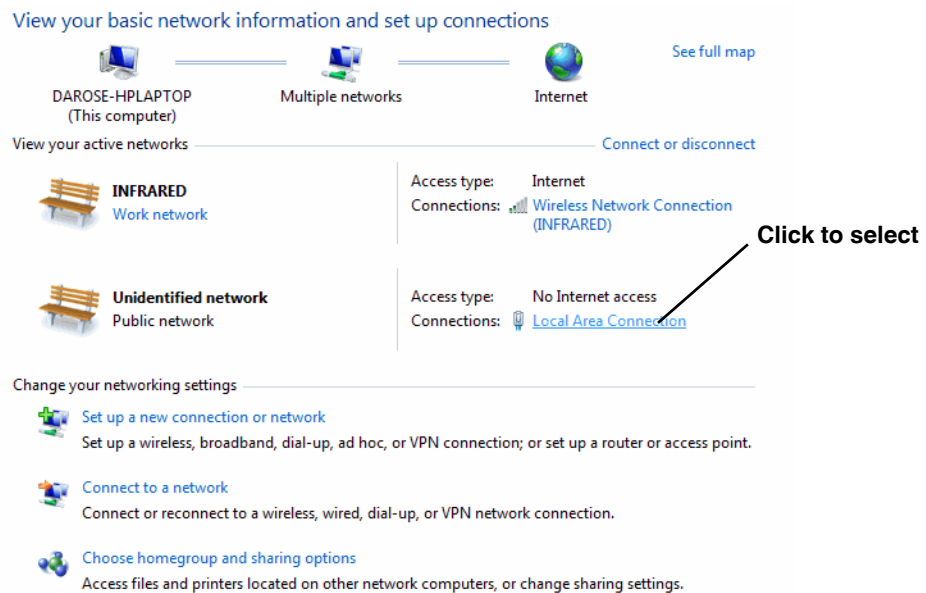
Step 2   Click to select the Local Area Connection then click Properties, as shown at the right.
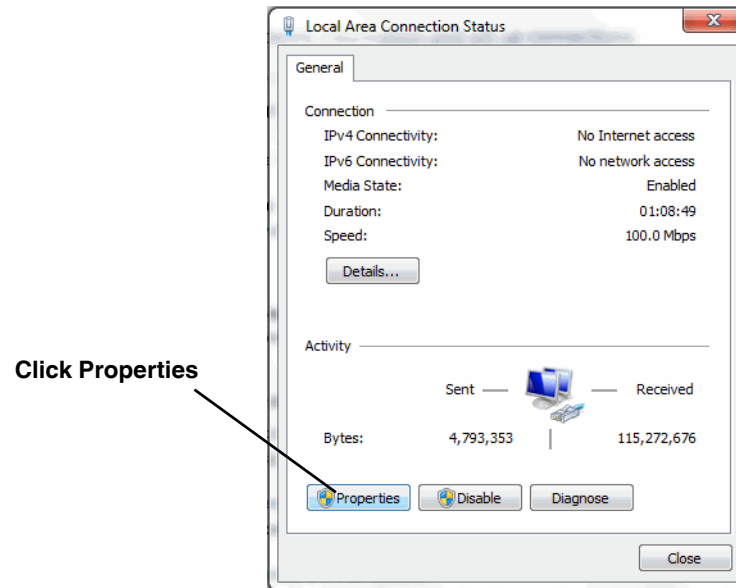
Click Properties

Step 3   Select Internet Protocol Version 4 (TCP/IPv4) as shown. Then click Properties.

Click to select

Click Properties
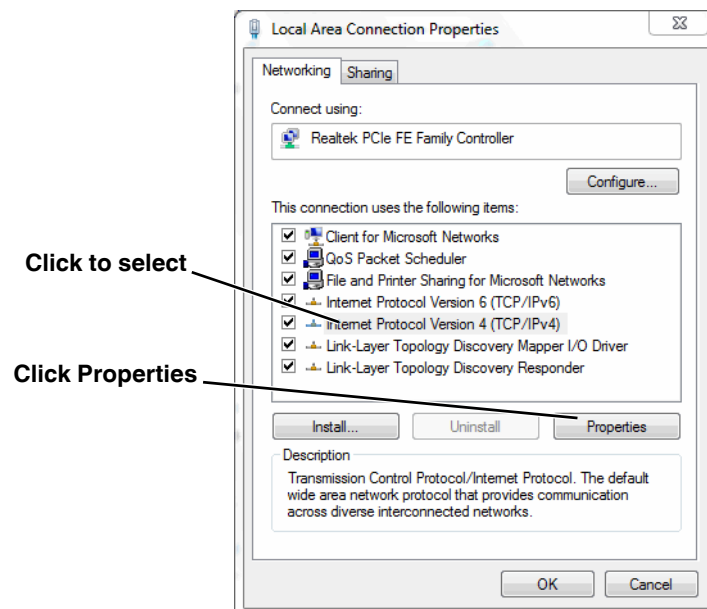
Step 4   Select **Use the following IP address**, then enter 192.168.250.xxx, where xxx is any number between 1-255, other than 116 (the camera default).
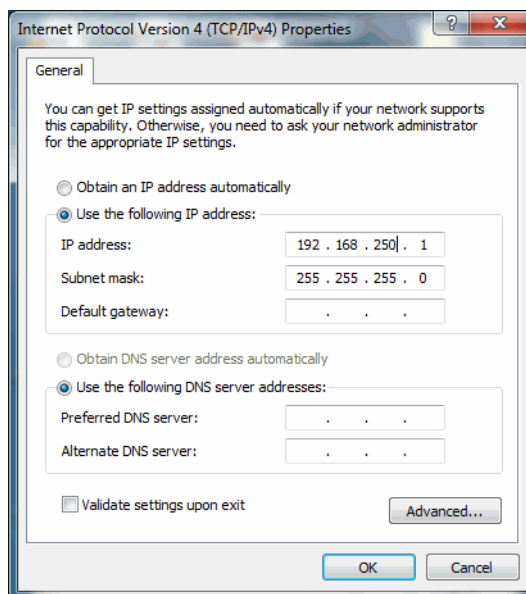
Step 5   Set the Subnet mask to 255.255.255.0, then click OK.

3   Serial Address: Decimal To Binary Conversion

Note, the order of the switches 1-8 is the reverse of the binary digits. For example, for address 1 the binary equivalent is 00000001 and the left-most switch (switch1) is on.

3.1   Address Conversion Table

Address	Sw1	Sw 2	Sw 3	Sw4	Sw 5	Sw 6	Sw 7	Sw 8
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
…	…	…	…	…	…	…	…	…
255	ON	ON	ON	ON	ON	ON	ON	ON

The following table shows the binary equivalent for each decimal address between 1 and 255.

Decimal	Binary	Decimal	Binary	Decimal	Binary	Decimal	Binary
1	00000001	65	01000001	129	10000001	193	11000001
2	00000010	66	01000010	130	10000010	194	11000010
3	00000011	67	01000011	131	10000011	195	11000011
4	00000100	68	01000100	132	10000100	196	11000100
5	00000101	69	01000101	133	10000101	197	11000101
6	00000110	70	01000110	134	10000110	198	11000110
7	00000111	71	01000111	135	10000111	199	11000111
8	00001000	72	01001000	136	10001000	200	11001000
9	00001001	73	01001001	137	10001001	201	11001001
10	00001010	74	01001010	138	10001010	202	11001010
11	00001011	75	01001011	139	10001011	203	11001011
12	00001100	76	01001100	140	10001100	204	11001100
13	00001101	77	01001101	141	10001101	205	11001101
14	00001110	78	01001110	142	10001110	206	11001110
15	00001111	79	01001111	143	10001111	207	11001111
16	00010000	80	01010000	144	10010000	208	11010000
17	00010001	81	01010001	145	10010001	209	11010001
18	00010010	82	01010010	146	10010010	210	11010010
19	00010011	83	01010011	147	10010011	211	11010011
20	00010100	84	01010100	148	10010100	212	11010100
21	00010101	85	01010101	149	10010101	213	11010101
22	00010110	86	01010110	150	10010110	214	11010110
23	00010111	87	01010111	151	10010111	215	11010111
24	00011000	88	01011000	152	10011000	216	11011000
25	00011001	89	01011001	153	10011001	217	11011001
26	00011010	90	01011010	154	10011010	218	11011010
27	00011011	91	01011011	155	10011011	219	11011011

28	00011100	92	01011100	156	10011100	220	11011100
29	00011101	93	01011101	157	10011101	221	11011101
30	00011110	94	01011110	158	10011110	222	11011110
31	00011111	95	01011111	159	10011111	223	11011111
32	00100000	96	01100000	160	10100000	224	11100000
33	00100001	97	01100001	161	10100001	225	11100001
34	00100010	98	01100010	162	10100010	226	11100010
35	00100011	99	01100011	163	10100011	227	11100011
36	00100100	100	01100100	164	10100100	228	11100100
37	00100101	101	01100101	165	10100101	229	11100101
38	00100110	102	01100110	166	10100110	230	11100110
39	00100111	103	01100111	167	10100111	231	11100111
40	00101000	104	01101000	168	10101000	232	11101000
41	00101001	105	01101001	169	10101001	233	11101001
42	00101010	106	01101010	170	10101010	234	11101010
43	00101011	107	01101011	171	10101011	235	11101011
44	00101100	108	01101100	172	10101100	236	11101100
45	00101101	109	01101101	173	10101101	237	11101101
46	00101110	110	01101110	174	10101110	238	11101110
47	00101111	111	01101111	175	10101111	239	11101111
48	00110000	112	01110000	176	10110000	240	11110000
49	00110001	113	01110001	177	10110001	241	11110001
50	00110010	114	01110010	178	10110010	242	11110010
51	00110011	115	01110011	179	10110011	243	11110011
52	00110100	116	01110100	180	10110100	244	11110100
53	00110101	117	01110101	181	10110101	245	11110101
54	00110110	118	01110110	182	10110110	246	11110110
55	00110111	119	01110111	183	10110111	247	11110111
56	00111000	120	01111000	184	10111000	248	11111000
57	00111001	121	01111001	185	10111001	249	11111001
58	00111010	122	01111010	186	10111010	250	11111010
59	00111011	123	01111011	187	10111011	251	11111011
60	00111100	124	01111100	188	10111100	252	11111100
61	00111101	125	01111101	189	10111101	253	11111101
62	00111110	126	01111110	190	10111110	254	11111110
63	00111111	127	01111111	191	10111111	255	11111111
64	01000000	128	10000000	192	11000000		